Red Tractor Assurance *for Farms*

Fresh Produce Scheme

Crop Module: Peppers (protected)

Effective 1st September 2015

Red Tractor Assurance

Welcome

Red Tractor Assurance for Farms
Fresh Produce Scheme

This crop specific module for peppers (protected) has been written to complement and avoid duplicating the generic principles of the Red Tractor Farm Assurance Fresh Produce Scheme standards. It is advisable to read the Red Tractor Farm Assurance Fresh Produce standards before reading this crop specific module. This module is designed to stimulate thought in the mind of the reader. It contains crop specific guidance and standards, where applicable, in addition to the requirements stated in the generic Fresh Produce standards.

Within this module the important requirements outlined in the crop specific standards section will be verified during the Red Tractor Farm Assurance assessment and compliance will form a part of the certification/approval decision.

Disclaimer and trade mark acknowledgement

Although every effort has been made to ensure accuracy, Assured Food Standards does not accept any responsibility for errors and omissions. Trade names are only used in this module where use of that specific product is essential. All such products are annotated® and all trademark rights are hereby acknowledged.

Notes: Pesticide Information

The Red Tractor Fresh Produce team has been working with Fera to provide tailored access to the LIAISON database for all Red Tractor Fresh Produce members. This system allows individual growers access to all information for plant protection products approved for use under the Red Tractor Fresh Produce Scheme.

LIAISON can be accessed under the Produce tab via the “Checkers and Services” page where you will also find a user manual. Searches will be filtered specifically for the crops for which you are registered. Once you have logged onto the site and clicked on the LIAISON hyperlink you will be directed to the LIAISON home screen.

You will need a username and password and these will be sent once you have registered:

http://assurance.redtractor.org.uk/rtassurance/services/Registration/members.eb .

General Introduction

Following a systematic approach will help growers identify and manage the risks involved in crop production. This module is based on a typical crop production process and food safety, health & safety, environmental and quality hazards are identified. Appropriate controls may then be established to minimise risk. Food safety and health & safety issues always take precedent over quality and environmental controls. The layout of this module follows the same structure as that used in the Red Tractor Farm Assurance Fresh Produce Standards. The content of the module is reviewed prior to the issue of updated editions. The review process considers both new developments and all relevant technology which has emerged since the last review was completed and which have been found to be both workable by the grower and beneficial to the environment. The aim is to transfer such information and technologies to growers.

Acknowledgements

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ADDITIONAL REQUIREMENTS AGAINST CURRENT STANDARDS

None for this crop module

CROP SPECIFIC STANDARDS

STANDARDS	HOW YOU WILL BE MEASURED additional crop specific requirements	RECORDS (to be kept for 2 years)
CQ.70.a **There must be designated areas for eating/ drinking/ smoking which are separate to the cropping areas**	■ Designated areas are clearly signed ■ Cropping areas are clearly signed with 'no eating/ drinking/ smoking' signs	
CQ.70.b **Records must be kept of introduction of biological control agents**		■ Biological control introduction records
CQ.70.c **Written procedures must be in place in case of an oil spillage**	■ Adequate procedure to prevent environmental contamination	■ Records of oil spillages

GUIDANCE

CHOICE OF VARIETY OR ROOTSTOCK AND PLANT HEALTH CERTIFICATION

PROPAGATION

Growers should formalise the supply contract with their propagators, stipulating pesticides that may or may not be used. Growers should ensure the supplier adheres to their contractual requirements by requesting crop treatment records and making inspection visits.

Growers should visit their propagators to inspect their plants before delivery.

Plants should be isolated and carefully inspected on delivery and any concerns or complaints raised immediately with the propagator.

SITE AND SOIL MANAGEMENT

SPECIFIC HYGIENE MEASURES

Previous cropping

Every effort should be made to reduce pest numbers on current crops before pests such as spider mites go into diapause in the autumn. High volume sprays using a short persistence insecticide may be used where there is still a pest problem after termination of cropping and prior to plant removal.

At the end of cropping, fog or fumigate the crop with a suitable disinfectant. Remove the crop, any weeds and all debris within 2 days of treatment and dispose of them by removing off site (ensure the load is covered), or by efficient composting. Plastic floor sheeting should be recycled where possible, but the risk of carry-over of disease organisms should be carefully considered in relation to its re-use on site.

Wash down the glass and the structure inside the glasshouse and treat with a suitable disinfectant (e.g.Horticide®, or Jet 5®).

In the cases of previous leaf miner or leafhopper problems, a high volume spray of short persistence insecticide should be applied to bare ground, walls and structure when all equipment has been removed. Persistent pyrethroid insecticides should not be used because of their possible harmful effects on biological control agents.

Equipment

Thoroughly clean picking boxes, trolleys, tractor tyres, footwear and any associated tools and equipment. Treat them with a disinfectant as listed above. Store cleaned boxes and equipment carefully to avoid re-contamination.

After using disinfectants in the glasshouse thoroughly ventilate the house to remove all traces of vapour. Rinse picking trays with water after treating with disinfectant.

Returnable market containers represent a particular risk for the spread of pests and diseases between production sites and packhouses. This is an ongoing risk, not just one between crops.

Exterior

Destroy all weeds around the glasshouse before the new crop arrives and at regular intervals during the season using non-hormone type weed killers of short persistence, or mowing. Several common weeds (e.g. chickweed, sowthistle, and dandelion) are known hosts of tomato spotted wilt virus (TSWV) and could act as a source of this virus for the pepper crop. Weeds may also be a means of carry-over of other virus disease (e.g. ToMV, CMV), of powdery mildew and of various pests.

New crop establishment

For soil-grown crops, the soil may be sterilised with steam, or other suitable sterilant (though not for organic crops), for the control of weeds and root diseases. Annual treatment will generally be necessary to reduce the risk of root diseases. In organic crops, soil management, especially organic matter amendment, and the careful selection of resistant varieties or rootstocks are of particular importance.

Rockwool or other growing media slabs may be re-used where possible, but only after sterilisation with steam.

As soon as the new crop arrives, existing sticky traps should be removed and examined. Further traps should be hung in each glasshouse and these should be assessed and replaced regularly to monitor the pest situation.

Trays containing the new season's plants should be placed only on a clean surface (e.g. new polythene, disinfected and rinsed concrete).

Signage

Glasshouses must have appropriate 'No Smoking/No Food' signs and staff should be provided with a clearly defined area to eat/drink. Hand washing areas and sanitising stations should be clearly identified with usage instructions in all relevant languages.

Use of bumblebee pollinators in protected crops

The bumblebees used for pollinating protected salad crops may be of a species which is not native to the UK and supplied and used under a licence from Natural England. Growers using bumblebees will be made aware by their suppliers of the requirements necessary to comply with any licence and should adhere to these requirements.

ENVIRONMENTAL PROTECTION & CONTAMINATION CONTROL

THE BASIC APPROACH TO CROP PROTECTION

Key principles of ICM for protected salad crops

a. Biological, environmental and cultural methods of pest and disease control are to be used as the first line of defence.

b. Chemical pesticides are only to be used when biological controls are not available or shown not to be working.

c. Crops should be monitored at least weekly and records made of pest, disease and biological control organism levels.

d. Records must be kept of the introduction of biological control agents.

e. Climate control computers should be used to ensure a suitable environment is maintained at all times.

f. Records must be kept of all pesticide applications.

Adaptation for new pests and diseases

The occurrence of a new disease or pest problem is largely unpredictable. It may arise, for example, when a previously non-indigenous disease or pest becomes established in the UK (e.g. powdery mildew),with a change in variety or cropping practice (e.g. a switch from soil to substrate cropping) or when a pathogen/pest previously controlled by a particular pesticide develops resistance. In all of these situations it may be necessary to implement additional pesticide treatments.

A proposed schedule for controlling 'new' pest or disease problems, in order of priority, is described below.

a. Identification of the causal agent of the problem is critical to achieve control and new pests and diseases could be the subject of statutory action if they are classed as quarantine organisms. In case of doubt it is essential to seek advice from the Plant Health & Seeds Inspectorate of the Food and Environment Research Agency (FERA).

b. The key priority is that the organism is controlled by means of a change in glasshouse environment, crop culture, biological or other non-chemical method. In some situations however, it is possible that additional use of pesticides may be necessary, at least in the short term or until a suitable alternative resistant variety is available. Such new varieties should be incorporated into the cropping programme as they become available, providing they meet the end-market specifications.

c. The 'new' pest or disease may be controlled by selecting products already known to be compatible with the biological control measures.

d. If none of these pesticides provide effective control, advice should be sought from a suitably qualified adviser or a technical representative of the relevant Crop Association on a suitable alternative product, which is currently approved for use on the appropriate protected crop under Control of Pesticides Regulations (COPR) (1986) and Plant Protection Products Regulations (PPR) (1991)

TRAINING REQUIREMENTS

Pest and disease identification

Staff working on protected sweet pepper crops should be able to recognise the following pests and diseases and their damage symptoms:

- *Botrytis* (grey mould) on leaves, stems and fruit
- *Fusarium* rots, especially on fruit
- *Pythium*, *Fusarium*, *Pyrenochaeta* and *Phytophthora* root and stem base rots.
- Various relevant virus diseases, such as tomato spotted wilt virus (TSWV) and tomato mosaic virus (ToMV).
- Aphids
- Glasshouse whitefly
- Spider mites and other mites

- Caterpillars
- Leafhoppers
- Leafminers
- Thrips
- Mealy bugs

Staff should also be able to recognise biological control organisms being used.

Staff should know to whom to report when the above pests and diseases, or other problems regularly found on a particular nursery, are first detected during the season. Managers and supervisors should appreciate the relative risk to their crops from the relevant pests and diseases and be alert to the risk of new pests and diseases, such as the Southern Green Stink Bug and Pepper Weevil and diseases, such as powdery mildew or *Phytophthora capsaciin* peppers. Pepper weevil (*Anthonomus eugenii*) is a serious pest of peppers in North and Central America and in Oceania. It has also recently been identified on crops in Holland. It is easily overlooked in crop monitoring.

In-service training

Training in identification of pests and diseases, their damage and their biological controls and an appreciation of the objectives of this protocol should be given to each new member of staff and should be regularly updated for all staff.

All staff working on the nursery, both regular and casual, should be instructed to satisfy COSHH requirements with respect to pesticide treatments, and to satisfy the requirements of the General Food Hygiene Regulations.

Monitoring

Regular monitoring of pests and diseases and biological control agents is of vital importance so that quick corrective action can be taken if required. Quick diagnosis and action are fundamental to effective control. It is essential that all crops are walked at least once a week and records kept of each inspection. All nursery staff should be alert to fresh pest or disease symptoms or signs of imbalance with biological control mechanisms.

General requirements

It is recommended that the following standards are adhered to when growing sweet peppers:

- when buying in plants, specifications for propagation, including pest and disease control measures, should be agreed with the propagator who, in turn, should provide the grower with documentation confirming pesticide applications, that these meet legal requirements and that application records are held by the propagator.
- vehicles used to transport plants should be clean and adequately heated. Caution should be exercised where vehicles have previously been used to transport fruit and vegetables, especially tomatoes and peppers, or potentially phytotoxic chemicals.
- steps should be taken to minimise nutrient run off into soil and water courses.
- steps should be taken to minimise nitrate levels in applied nutrient solutions.
- the introduction and monitoring of biological control agents should be recorded.
- written procedures for the management and recording of incidents involving oil spillage must be in place, where oil is used as a heating fuel.
- written procedures for the management and recording of incidents involving broken glass and other potential foreign objects in the glasshouse must be in place to minimise the risk of contamination.
- all glasshouses must have appropriate “No Smoking/ No Food” signs and staff must be provided with a clearly defined area in which to eat and drink.

It is also recommended that:

- if the crop is grown in an isolated substrate, the substrate should, where possible, be reused for more than one crop, but not where there is a significant risk of disease carry-over.
- where isolated substrates are reused, they should be steam sterilised between crops.
- volume of run-off should be measured and samples analysed.

PEST CONTROL

Biological control

The table below lists available biological control measures. The introduction and monitoring of biological control agents should be recorded.

The rates of introduction of biological agents should be based on the supplier's recommendations.

PEST	CONTROL	NOTES
Western flower thrips or onion thrips	a) *Neoseiulus (Amblyseius) cucumeris* b) *Amblyseius degenerans* c) *Amblyseius swirskii* d) *Orius spp.* e) *Verticillium lecanii*	c) promising results especially in warm climates d) only the indigenous species e) for corrective action
Aphids **- Peach-potato** **- Melon-cotton** **- Glasshouse potato** **- Potato**	a) *Aphidius colemani* b) *Aphidius ervi* c) *Aphidoletes aphidimyza* d) *Episyrphus balteatus* e) *Aphelinus abdominalis*	b) more effective than a) against larger aphids (e.g. *Aulacorthum solani*) Growers should be aware that parasitic wasps may become less effective in summer due to the presence of naturally occurring hyperparasitoids
Two-spotted spider mite	a) *Phytoseiulus persimilis* b) *Feltiella acarigusa* c) *Amblyseius californicus*	
Whitefly	a) *Encarsia formosa* b) *Amblyseius swirskii* c) *Verticillium lecanii* (Mycotal®)	Not normally a problem in peppers b) promising results especially in warm climates c) for corrective action
Caterpillar	a) *Bacillus thuringiensis* b) *Trichogramma spp* c) spinosad	a) best results are obtained on young caterpillars, so monitoring and early application essential b) an egg parasite so effective monitoring of adult moths is vital
Broad mite	*Neoseuilus (Amblyseius) cucumeris*	Remove affected plants. Do not introduce biocontrol agents on leaf material

Chemical control

In some instances biological controls are not available or may not be totally effective and suitable pesticides may be necessary.

PEST	ACTIVE INGREDIENT	NOTES
Onion thrips	a) fatty acids b) spinosad	
Western flower thrips (WFT)	a) thiacloprid b) abamectin	a) harmful to beneficial insects such as Orius spp b) harmful to beneficials but potentially useful as end of season clean up spray
Aphids	a) pirimicarb b) pymetrozine	a) may have adverse effects on *Amblyseius*
Leaf hopper	indoxacarb	More IPM compatible than neonicotinoids
Whitefly	a) fatty acids	
Two spotted spider mite	a) spiromesifen b) abamectin	a) also active against whitefly but more information needed on crop safety and effect on beneficials b) harmful to beneficials but potentially useful as end of season clean up spray
Southern Green Stink Bug (Nezara viridula)	Lambda cyhalothrin	
Pepper weevil (*Anthonomus eugenii*)		A potentially serious pest recorded in Holland in 2012 but not yet in the UK. Currently the subject of a Pest Risk Analysis by Plant Health Authorities

Notes: Spot sprays of glucose polymer (Eradicoat® or Majestik®) may be used against whitefly, thrips, aphids and spider mites. Polysaccharide (Agri-50E®) is also available for use against aphids and whitefly in particular. These materials act in a physical way and therefore have fallen outside the scope of the Control of Pesticide Regulations (1986) but approval under PPPR will now be required. Thorough spraying is essential to hit the pest target and achieve control.

DISEASE CONTROL

Certain diseases are relatively common and occur on many holdings each year. The procedure for the control of the common disease problems is given in detail. The procedure for other diseases is given in outline and further technical advice should be sought as necessary.

It cannot be emphasised too strongly that regular crop monitoring with rapid and accurate disease identification and an appropriate rapid response, involving cultural changes, a glasshouse environmental change, roguing of the affected plant or a fungicide treatment, is essential to fulfil the objective of minimising fungicide use.

All crops should be walked and inspected for disease at least once every seven days. If disease is overlooked, or seen but no action taken, then several fungicide applications may be required to bring the problem under control, compared with fewer applications if prompt action is taken.

BOTRYTIS

Preventative action decision	Fungicides
General	
Control humidity (<85% RH)	
Keep foliage and floor dry	
Avoid plant damage	
Remove debris after trimming	
On young plants	
Avoid damage at planting Treat if damaged	Azoxystrobin, fenhexamid, cyprodonil/fludioxonil, boscalid/ pyraclostrobin. Bacillus subtilis (Serenade®)
On flowers, leaves, branches and fruit	
Check humidity control and plant handling	Azoxystrobin, fenhexamid

Notes:

Azoxystrobin (Amistar), which currently has an extension of use for powdery mildew control, may have some activity against Botrytis but resistance to this fungicides is likely if used alone.

Choosing fungicides with different modes of action in a programme is a key component of an effective resistance management strategy.

OTHER DISEASES

DISEASE	COMMENT	ACTION
***Pythium* root rot**	Young plants are more susceptible	Use clean water source. Sterilise soil and re-used slabs. Drench with propamocarb hydrochloride. *Gliocladium catenulatum* (Prestop®)
***Phytophthora* root rot**	Uncommon but easily introduced by contamination of water supplies from ground water Phytophthora capsaci, a potentially serious disease, reported in UK in 2007 but not since then	Use clean water source. Sterilise soil and re-used slabs. Avoid water-logging. Prestop®). Seek advice if *Phytophthora capsaci* suspected
***Rhizoctonia* stem base rot**	Uncommon. Soil crops	Sterilise soil
White rot (*Sclerotinia*)	Mainly in soil-grown crops	Remove affected plant parts. Sterilise soil
Powdery mildew	Serious problem in Holland; not recently recorded in UK	Sulphur, azoxystrobin
***Fusarium* fruit and stem rot**	Caused by *Fusarium spp* and recently identified in the UK	Ongoing HDC project. Incidence encouraged by high humidity. Aborted fruit a potential source of infection so hygiene important. Fruit rot may develop in storage so check before dispatch
***Verticillium* wilt**	Rare. Mainly soil crops	Sterilise soil
Tomato mosaic virus (ToMV)	Has been common in Holland; less so in UK to-date. Wide range of symptoms e.g. blotchy ripening, bumpy fruit, leaf mosaic	Choose resistant variety. Dip hands in skimmed milk when working in susceptible crop in the early stages. Remove affected plants
Cucumber mosaic virus (CMV)	Uncommon. Easily confused with ToMV	Control aphid vectors
Tomato spotted wilt virus (TSWV)	Uncommon. Increasing risk. Symptoms can be similar to CMV	Control WFT vector. Remove affected plants. Control weeds. Avoid materials harmful to predators, such as neonicotinoids
Pepper yellow veins virus	Mostly in soil grown crops. *Olpidium* vector. No fruit symptoms described. Could potentially be a problem in recirculated systems	Sterilise soil. Use clean water source

APPROVED USES NOT INCLUDED ON THE PRODUCT LABEL

In many circumstances, particularly for minor crops, product labels do not include all of the approved uses and growers wishing to check the approval notice of a particular product should note that this information is available using the LIAISON® search accessible via their RED TRACTOR Farm Assurance home page after logging in.

A search on the Extension of Authorisation for Minor Use page of LIAISON® by crop or product name should yield a results page. A click on the product name should link to a summary of the approval information. Near the bottom of the summary is the specific off-label number (e.g. 0246/09) and this link will open up a pdf of the current EAMU document giving details of the extension of use.

NUTRITION

Maintaining an optimum nutritional status for the crop and avoiding tissue damage resulting from nutrient deficiency symptoms or over-dosing of fertilisers reduces the risk of disease infection of both aerial parts of the plant and the roots.

Growers should consider the recirculation of water and nutrients. If not, they should take steps to minimise nutrient run-off into soil and water courses.

Growers should measure the volume of run-off and have samples analysed.

RESIDUES AND CONTAMINANTS

Red Tractor Farm Assurance Fresh Produce is aware that a key area in the production of fresh produce which requires continued attention by growers and their advisers is that of keeping pesticide residues to a minimum. This issue is not just one of meeting MRL legal requirements but ensuring that any individual or multi residues are kept as low as possible below this level.

The key targets are:

- optimising the use of post-harvest treatments, though none are likely to be used for sweet peppers.
- ensuring minimum harvest intervals are followed.
- ensuring that application equipment is applying products correctly and that all staff applying pesticides are adequately trained and qualified.

Currently there are no residue issues associated with this crop grown in the UK but awareness needs to be maintained for any future issues.

Red Tractor Assurance

Certification Bodies

Your routine point of contact with the Scheme is through your Certification Body.

Certification Bodies are licensed by Red Tractor to manage membership applications and to carry out assessment and certification against the Standards. The table below shows which Certification Bodies apply to each enterprise.

Certification Body	Beef and Lamb	Dairy	Combinable Crops and Sugar Beet	Fresh Produce	Pigs	Poultry
NSF	✔	✔	✔	✔	✔	✔
Kiwa PAI	✔	✔	✔	✔	✔	✔
SAI Global	✔	✔	✔	✔	✔	✔
SFQC	✔	✔	✔	✔		
NIFCC (Northern Ireland)		✔				✔
QWFC (Wales)		✔				

NSF Certification

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Fresh Produce Standards